

What is claimed are:

1. A DC-DC converter of synchronous rectification type comprising at least one main switching element and a primary winding of a transformer for forming a primary side circuit connected to a DC power source;

at least one rectifying switching element for forming a secondary side circuit connected between an electric load and a secondary winding electromagnetically coupled to said primary winding of said transformer to drive said rectifying switching element synchronously with the switching operation of said main switching element in order to supply DC output through said secondary side circuit to said load;

a current detector for detecting electric current flowing through said primary side circuit;

biasing means for producing a greater bias voltage than voltage corresponding to excitation current through said transformer; and

a comparator for driving said rectifying switching element when detected voltage by current detector exceeds the biased voltage by said biasing means.

2. A DC-DC converter of synchronous rectification type comprising at least one main switching element and a primary winding of a transformer for forming a primary side circuit connected to a DC power source;

at least one rectifying switching element for forming a secondary side circuit connected between an electric load and a secondary winding

electromagnetically coupled to said primary winding of said transformer to drive said rectifying switching element synchronously with the switching operation of said main switching element in order to supply DC output through said secondary side circuit to said load;

a current detector for detecting electric current flowing through said primary side circuit;

biasing means for producing a bias voltage;

a ramp signal generator for producing ramp signals in proportion to voltage corresponding to excitation current flowing through said transformer; and

a comparator for driving said rectifying switching element when said detected voltage by said current detector exceeds voltage of superimposed signal of biased voltage and ramp signal of said ramp voltage generator.

3. A DC-DC converter of synchronous rectification type comprising at least one main switching element and a primary winding of a transformer for forming a primary side circuit connected to a DC power source;

at least one rectifying switching element for forming a secondary side circuit connected between an electric load and a secondary winding electromagnetically coupled to said primary winding of said transformer to drive said rectifying switching element synchronously with the switching operation of said main switching element in order to supply DC output through said secondary side circuit to said load;

a current detector for detecting electric current flowing through said primary side circuit;

biasing means for producing a bias voltage;

a ramp signal generator for producing ramp signals in proportion to voltage corresponding to excitation current flowing through said transformer; and

a comparator for driving said rectifying switching element when superimposed voltage of said detected voltage by said current detector and ramp signal from said ramp voltage generator exceeds biased voltage by biasing means.

4. A DC-DC converter of synchronous rectification type of claim 2 or 3, wherein said ramp signal generator comprises an integration circuit connected to a secondary winding of said transformer or a winding for producing voltage corresponding to the voltage on said secondary winding for producing ramp signals whose inclination is inverted every half cycle of voltage applied on said winding.

5. A DC-DC converter of synchronous rectification type of claim 2 or 3, wherein said ramp signal generator comprises a synchronizing signal generator connected to a secondary winding of said transformer or a winding for producing voltage corresponding to the voltage on said secondary winding for producing pulse signals in synchronization with frequency of voltage on the winding; and an integration circuit for producing ramp signals whose inclination is inverted every half cycle of pulse signals from said synchronizing signal generator.

6. A DC-DC converter of synchronous rectification type of claim 2 or 3, wherein said ramp signal generator comprises a waveform shaper for converting pulse signals generated from an oscillator into ramp signals whose inclination is inverted every half cycle of said output pulse signals, said pulse signals from said oscillator providing a datum of switching frequency for said main switching element.